

CLAIMS

- [1] A hydrogen generator comprising:
a mixed gas passage configured to flow a mixed gas containing two or more components;
first and second passages configured to branch off, at their leading ends, from the mixed gas passage and join to each other at their trailing ends;
first turning means formed in the first passage to turn the mixed gas flowing in the first passage in a first direction;
second turning means formed in the second passage to turn the mixed gas flowing in the second passage in a second direction opposite to the first direction; and
a hydrogen generating section configured to generate hydrogen by causing a chemical reaction of the mixed gas which flows out from the joined trailing ends of the first and second passages.
- [2] The hydrogen generator according to claim 1,
wherein the first and second passages are formed so as to allow the mixed gas to turn in the first and second directions respectively, when flowing in planes perpendicular to the outflow direction of the mixed gas flowing out from the trailing ends of the first and second passages.
- [3] The hydrogen generator according to claim 2,
wherein the first and second passages have a common central axis and are hollow in shape, each having an open outer periphery and a circular opening at the center thereof, said outer periphery of each passage constituting an inlet that serves as the leading end while said opening of each passage constitutes an outlet that serves as the trailing end;
wherein the first turning means is composed of a plurality of partition walls that partition the inner space of the first passage in a direction along the central axis and each partition wall extends inwardly from the outer periphery of the inner space such that its trailing end is deviated from its leading end in said first direction with respect to a radial direction; and
wherein the second turning means is composed of a plurality of partition walls that partition the inner space of the second passage in a direction along the central axis and each partition wall extends inwardly from the outer periphery of the inner space such that its trailing end is deviated from its leading end in said second direction with

respect to a radial direction.

[4] The hydrogen generator according to claim 3,
wherein the angle of deviation of the trailing end from the leading end around the central axis in each partition wall is within the range of 45 to 90 degrees.

[5] The hydrogen generator according to claim 2,
wherein a plurality of said first and second passages and a plurality of said first and second turning means are arranged along the central axis.

[6] The hydrogen generator according to claim 1,
wherein the first and second passages are formed so as to allow the mixed gas to turn in the first and second directions respectively, when flowing in cylindrical planes parallel to the outflow direction of the mixed gas flowing out from the trailing ends of the first and second passages.

[7] The hydrogen generator according to claim 6,
wherein the first and second passages have a common central axis and are respectively formed in the shape of a tube of annular section, and one end face of each passage constituting an inlet that serves as the leading end while the other end face of each passage constitutes an outlet that serves as the trailing end;

wherein the first turning means is composed of a plurality of partition walls that turn in the first direction, helically partitioning the tubular inner space of the first passage; and

wherein the second turning means is composed of a plurality of partition walls that turn in the second direction, helically partitioning the tubular inner space of the first passage.

[8] The hydrogen generator according to claim 7,
wherein the turning angle of each of the partition walls from its leading end to its trailing end is within the range of 45 to 90 degrees.

[9] The hydrogen generator according to claim 8,
wherein the outlets of turning passages separated by the partition walls are partially closed.

[10] The hydrogen generator according to claim 9,
wherein the first passage and the second passage are separated from each other by a cylindrical dividing wall, the outlets of the turning passages of either the first or second passage are closed, and an opening is formed in the dividing wall at a position in the vicinity of each of the closed outlets.

[11] The hydrogen generator according to claim 6,

wherein a plurality of said first passages are arranged along the central axis such that the trailing end of a first passage located in an upstream position when viewed in the flowing direction of the mixed gas is connected to the leading end of a first passage located in a downstream position and a plurality of said second passages are arranged along the central axis such that the trailing end of a second passage located in an upstream position when viewed in the flowing direction of the mixed gas is connected to the leading end of a second passage located in a downstream position.

[12] The hydrogen generator according to claim 1,

wherein the mixed gas is a mixture of water and an organic compound containing at least carbon and hydrogen; the chemical reaction is a steam reforming reaction in which hydrogen is generated from the mixed gas of the organic compound and water; the hydrogen generating section is a reforming reactor section for generating a hydrogen-rich reformed gas through the steam reforming reaction;

wherein the first turning means and second turning means are located at positions upstream of the reforming reactor section; and

wherein the mixed gas flowing out from the joined trailing ends of the first and second passages is supplied to the reforming reactor section to generate hydrogen.

[13] The hydrogen generator according to claim 1,

wherein the mixed gas is a mixture of the reformed gas and oxygen, and a selective oxidation reactor section is used in place of the hydrogen generating section, the selective oxidation reactor section reducing carbon monoxide contained in the reformed gas through a selective oxidation reaction in which carbon monoxide is converted into carbon dioxide;

wherein the first turning means and second turning means are located at positions upstream of the selective oxidation reactor section; and

wherein the mixed gas flowing out from the joined trailing ends of the first and second passages is supplied to the selective oxidation reactor section to reduce carbon monoxide contained in the reformed gas.